

Claims

- [c1] 1.A structure for attaching together or sealing a space between a first component and a second component that have different rates or amounts of dimensional change upon being exposed to temperatures other than ambient temperature, said structure comprising a plurality of support members fixedly disposed between said first component and said second component, each of said support member defining a cavity and accepting therein at least a first attachment structure that slidably engages a mating second attachment structure provided on said second component such that said second component is capable of floating in an independent movement relative to said first component in at least one of radial and axial direction, said structure further substantially preventing a communication between a medium present in a space between said first component and said second component from and another medium present in a space defined by said second component.
- [c2] 2.The structure according to claim 1, wherein said first attachment structure comprises at least a first ring selected from the group consisting of split rings, laminar rings, and multiple split rings attached together; said at least a first ring is disposed in said cavity of said support member around said second component; said mating second attachment structure comprises at least two second rings selected from the group consisting of split rings, laminar rings, and multiple split rings attached together; said second rings are spaced apart to slidably engage said first ring therebetween; and at least a portion of a surface of said second rings always overlaps at least a portion of a surface of said at least first ring.
- [c3] 3.The structure according to claim 2, wherein said second rings are slidable over said second component.
- [c4] 4.The structure according to claim 2, wherein said first component and said second component are components of a gas turbine engine.
- [c5] 5.The structure according to claim 4, wherein said first component is selected from the group consisting of combustor casing and turbine casing, and said second component is a combustor liner when said first component is a

combustor casing, and a turbine shroud ring when said first component is a turbine casing.

[c6] 6.The structure according to claim 5, wherein said first component comprises a material selected from the group consisting of steel and iron alloy; and said second component comprises a ceramic composite material.

[c7] 7.The structure according to claim 6, wherein a surface of said first component is coated with a thermal barrier coating, and a surface of said second component is coated with a material selected from the group consisting of thermal barrier coating materials and materials that inhibit a reaction between said ceramic composite material and a combustion product gas in said turbine engine.

[c8] 8.A structure for attaching together a first component and a second component that have different rates or amounts of dimensional change upon being exposed to temperatures other than ambient temperature, said structure comprising a plurality of protuberances formed on a surface of said first component and a plurality of corresponding cavities formed into an surface of said second component opposite said surface of said first component, each of said protuberances slidably engaging one of said cavities such that said second component is capable of floating in an independent movement relative to said first component in at least one of radial and axial direction.

[c9] 9.A structure for attaching together a first component and a second component that have different rates or amounts of dimensional change upon being exposed to temperatures other than ambient temperature, said structure comprising a plurality of protuberances formed on a surface of said second component and a plurality of corresponding cavities formed into an surface of said first component opposite said surface of said second component, each of said protuberances slidably engaging one of said cavities such that said second component is capable of floating in an independent movement relative to said first component in at least one of radial and axial direction.

[c10] 10.A structure for attaching together or sealing a space between a first

component and a second component that have different rates or amounts of dimensional change upon being exposed to temperatures other than ambient temperature, said structure comprising:

(a) a plurality of support members fixedly disposed between said first component and said second component, each of said support member defining a cavity and comprising at least a first ring and at least two mating second rings, said at least first ring and said at least two second rings being selected from the group consisting of split rings, laminar rings, and multiple split rings attached together, said first rings being disposed in said cavity of said support member around said second component, said at least two second rings being spaced apart slidably to engage said at least first ring therebetween such that at least a portion of a surface of said at least two second rings always overlaps at least a portion of a surface of said at least a first ring; and

(b) a plurality of protuberances formed on a surface of said first component and a plurality of corresponding depressions formed into an surface of said second component opposite said surface of said first component, each of said protuberances slidably engaging one of said cavities;

wherein said rings and a combination of said protuberances and said depressions allow for an independent floating movement of said second component relative to said first component in at least one of radial and axial direction, and said structure further substantially prevents a communication between a medium present in a space between said first component and said second component and another medium present in a space defined by said second component.

[c11]

11.A method for attaching together a first component and a second component that have different rates or amounts of dimensional change upon being exposed to temperatures other than ambient temperature and for substantially preventing a communication between a medium present in a space between said first component and said second component and a medium present in a space defined by said second component, said method comprising: (1) providing said first component and said second component that have a longitudinal or axial direction and a radial direction, generally have different

radial dimensions, and are spaced apart from one another such that their longitudinal axes substantially coincide at room temperature; (2) providing a plurality of support members disposed between said first component and said second component for slidably attaching said first component to said second component such that said second component is capable of floating in an independent movement relative to said first component in at least one of radial and axial direction, each support member defining a cavity and accepting a first attachment structure therein; (3) providing a mating second attachment structure on the second component; and (4) slidably engaging said first attachment structure with said mating second attachment structure to attach said first component to said second component.

[c12] 12.The method according to claim 11, wherein said first attachment structure comprises at least a first ring selected from the group consisting of split rings, laminar rings, and multiple split rings attached together; said first ring is disposed in said cavity of said support member around said second component; said mating second attachment structure comprises at least two second rings selected from the group consisting of split rings, laminar rings, and multiple split rings attached together; said second rings are spaced apart to slidably engage said first ring therebetween; and at least a portion of a surface of said second rings always overlaps at least a portion of a surface of said at least first ring; said method further substantially prevents a medium present in a space between said first component and said second component from entering a space defined by said second component.

[c13] 13.The method according to claim 12, wherein said second rings are slidable over said second component.

[c14] 14.The method according to claim 13 further comprising providing at least a first ring and at least two second rings, said rings being selected from the group consisting of split rings, laminar rings, and multiple split rings attached together; said first ring being disposed in said cavity around said protuberance; said second rings being disposed around said protuberance and spaced apart to slidably engage said first ring therebetween; and at least a portion of a surface

of said second rings always overlapping at least a portion of a surface of said at least first ring.

- [c15] 15.The method according to claim 12, wherein said first component and said second component are components of a gas turbine engine.
- [c16] 16.The method according to claim 15, wherein said first component is selected from the group consisting of combustor casing and turbine casing, and said second component is a combustor liner when said first component is a combustor casing, and a turbine shroud ring when said first component is a turbine casing.
- [c17] 17.The method according to claim 16, wherein said first component comprises a material selected from the group consisting of nickel- and cobalt-based super alloys; and said second component comprises a ceramic composite material.
- [c18] 18.The method according to claim 17, wherein a surface of said first component is coated with a thermal barrier coating, and a surface of said second component is coated with a material selected from the group consisting of thermal barrier coating materials and materials that inhibit a reaction between said ceramic composite material and a combustion product gas in said turbine engine.
- [c19] 19.A turbine engine comprising a first component, a second component that is disposed within a space defined by said first component, and a structure for attaching together or sealing a space between said first component and said second component that have different rates or amounts of dimensional change upon being exposed to temperatures other than ambient temperature, said structure comprising a plurality of support members fixedly disposed between said first component and said second component, each of said support member defining a cavity and accepting therein at least a first attachment structure that slidably engages a mating second attachment structure provided on said second component such that said second component is capable of floating in an independent movement relative to said first component in at least one of radial and axial direction, said structure further substantially preventing a

communication between a medium present in a space between said first component and said second component from and another medium present in a space defined by said second component.

- [c20] 20.A turbine engine comprising a first component, a second component that is disposed within a space defined by said first component, and a structure for attaching together or sealing a space between said first component and said second component that have different rates or amounts of dimensional change upon being exposed to temperatures other than ambient temperature, said structure comprising:
- (a) a plurality of support members fixedly disposed between said first component and said second component, each of said support member defining a cavity and comprising at least a first ring and at least two mating second rings, said at least first ring and said at least two second rings being selected from the group consisting of split rings, laminar rings, and multiple split rings attached together, said first rings being disposed in said cavity of said support member around said second component, said at least two second rings being spaced apart slidably to engage said at least first ring therebetween such that at least a portion of a surface of said at least two second rings always overlaps at least a portion of a surface of said at least a first ring; and
 - (b) a plurality of protuberances formed on a surface of said first component and a plurality of corresponding depressions formed into an surface of said second component opposite said surface of said first component, each of said protuberances slidably engaging one of said cavities;
- wherein said rings and a combination of said protuberances and said depressions allow for an independent floating movement of said second component relative to said first component in at least one of radial and axial direction, and said structure further substantially prevents a communication between a medium present in a space between said first component and said second component and another medium present in a space defined by said second component.